3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by Shaw at the Impact Area South of Former POW Training Facility, Former Rifle/Machine Gun Range, Parcels 100Q and 101Q, including unexploded ordnance (UXO) avoidance, environmental sampling and analysis, and groundwater monitoring well installation activities.

Shaw conducted the SI in two phases. Phase I field activities consisted of the collection and analysis of 11 surface soil samples, 8 subsurface soil samples, and 2 groundwater samples (IT, 2002a). Two monitoring wells were also installed during Phase I activities. During Phase II activities, Shaw collected 11 additional surface soil samples, 12 subsurface soil samples, and re-sampled both monitoring wells previously installed at the site. Phase II sampling was performed to confirm the presence of organic compounds detected in groundwater and to determine the extent of lead detected in Phase I soil samples.

3.1 UXO Avoidance

UXO avoidance was performed at the IASPOW following methodology outlined in the SAP. Shaw UXO personnel used a low-sensitivity magnetometer to perform a surface sweep of the area of investigation prior to site access. After the area was cleared for access, sample locations were monitored following procedures outlined in the SAP.

3.2 Environmental Sampling

Environmental sampling performed during the SI at the IASPOW included the collection of surface soil samples, subsurface soil samples, and groundwater samples for chemical analysis. Sample locations were determined by observing site physical characteristics during a site walkover and by reviewing historical documents and aerial photographs. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analysis of site-related parameters listed in Section 3.4. Shaw contracted Environmental Services Network, Inc (ESN), a direct-push technology (DPT) subcontractor, to assist in surface and subsurface soil sample collection.

3.2.1 Surface Soil Sampling

Twenty-two surface soil samples were collected at the IASPOW, as shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Sample designations and analytical parameters are listed in Table 3-2. Soil sampling locations were determined in the field by the

Table 3-1

Sampling Locations and Rationale
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
IMP-IASPOW-GP01	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the southwestern portion of the area of investigation because review of aerial photographs showed ground surface disturbance. Soil samples were analyzed to determine if potential site-specific chemicals (PSSC) are present at the site.
IMP-IASPOW-GP02	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the southwestern portion of the area of investigation within an area where expended rounds were observed during the site walk. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP03	Surface soil subsurface soil	Surface and subsurface soil samples (2) were collected in the central portion of the area of investigation within an area where rounds were observed during the site walk. Also, aerial photograph review showed ground disturbance. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP04	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the central portion of the area of investigation because it is located downslope of a possible target berm observed during the site walk. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP05	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the northern portion of the area of investigation within an area where expended rounds were observed during the site walk. Also, review of aerial photographs showed ground surface disturbance. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP06	Surface soil subsurface soil	Surface and subsurface soil samples were collected along the northeastern boundary of the area of investigation because review of aerial photographs showed ground surface disturbance. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP07	Surface soil	Surface soil sample was collected from the southwestern end of a possible target berm identified during the site walk. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP08	Surface soil	Surface soil sample was collected from the middle portion of a possible target berm identified during the site walk. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP09	Surface soil	Surface soil sample was collected from the northeastern end of a possible target berm identified during the site walk. Also, review of aerial photographs showed ground surface disturbance in the area. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP10	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the west-central portion of the area of investigation along the southern edge of an area containing a significant amount of expended rounds of ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP11	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the central portion of the area of investigation along the northern edge of an area containing a significant amount of expended rounds of ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP12	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the central portion of the area of investigation within an area containing a significant amount of expended ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP13	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the north-central portion of the area of investigation along the northern edge of an area containing a significant amount of expended rounds of ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP14	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the northeastern portion of the area of investigation in the northeastern corner of an area containing a significant amount of expended rounds of ammunition. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP15	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the northeastern portion of the area of investigation in the northern edge of an area that appears disturbed in historical aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.

Table 3-1

Sampling Locations and Rationale
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
IMP-IASPOW-GP16	Surface soil subsurface soil	Surface and subsurface soil samples were collected to the east of the area of near an area that appears disturbed in historical aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP17	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the southeastern corner of the area of investigation near an area that appears disturbed in historical aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP18	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the eastern portion of the area of investigation between two areas that appear disturbed in historical aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP19	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the southeastern portion of the area of investigation near a possible target berm and an area that appears disturbed in aerial photographs. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-GP20	Surface soil subsurface soil	Surface and subsurface soil samples were collected in the south-central portion of the area of investigation near a possible target berm. Soil samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-MW01	Surface soil subsurface soil groundwater	Surface soil, subsurface soil, and groundwater samples were collected from the central portion of the area of investigation, potentially downgradient of a possible target berm observed during the site walk. Soil and groundwater samples were analyzed to determine if PSSCs are present at the site.
IMP-IASPOW-MW02	Surface soil subsurface soil groundwater	Surface soil, subsurface soil, and groundwater samples were collected from the southwestern portion of the area of investigation near an area where expended rounds were observed during the site walk. Soil and groundwater samples were analyzed to determine if PSSCs are present at the site.

Table 3-2

Soil Sample Designations and Analytical Parameters
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Parameters
			Field Duplicates	MS/MSD	
IMP-IASPOW-GP01	IMP-IASPOW-GP01-SS-QG0001-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP01-DS-QG0002-REG	3-4			
IMP-IASPOW-GP02	IMP-IASPOW-GP02-SS-QG0003-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP02-DS-QG0004-REG	3-4			
IMP-IASPOW-GP03	IMP-IASPOW-GP03-SS-QG0005-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP03-DS-QG0006-REG	3-4			
	IMP-IASPOW-GP03-DS-QG0045-REG	4-6	IMP-IASPOW-GP03-DS-QG0046-FD		TAL Metals
IMP-IASPOW-GP04	IMP-IASPOW-GP04-SS-QG0007-REG	0-1			TAL Metals, Explosives, VOCs, SVOCs, Pesticides, and Herbicides
	IMP-IASPOW-GP04-DS-QG0008-REG	3-4	IMP-IASPOW-GP04-DS-QG0009-FD		
IMP-IASPOW-GP05	IMP-IASPOW-GP05-SS-QG0010-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP05-DS-QG0011-REG	3-4			
IMP-IASPOW-GP06	IMP-IASPOW-GP06-SS-QG0012-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-GP06-DS-QG0013-REG	3-4			
IMP-IASPOW-GP07	IMP-IASPOW-GP07-SS-QG0014-REG	0-1			TAL Metals and Explosives
IMP-IASPOW-GP08	IMP-IASPOW-GP08-SS-QG0015-REG	0-1			TAL Metals and Explosives
IMP-IASPOW-GP09	IMP-IASPOW-GP09-SS-QG0016-REG	0-1			TAL Metals and Explosives
IMP-IASPOW-GP10	IMP-IASPOW-GP10-SS-QG0022-REG	0-1			TAL Metals
	IMP-IASPOW-GP10-DS-QG0023-REG	3-4			
IMP-IASPOW-GP11	IMP-IASPOW-GP11-SS-QG0024-REG	0-1			TAL Metals
	IMP-IASPOW-GP11-DS-QG0025-REG	3-4			
IMP-IASPOW-GP12	IMP-IASPOW-GP12-SS-QG0026-REG	0-1			TAL Metals
	IMP-IASPOW-GP12-DS-QG0027-REG	3-4			
IMP-IASPOW-GP13	IMP-IASPOW-GP13-SS-QG0028-REG	0-1			TAL Metals
	IMP-IASPOW-GP13-DS-QG0029-REG	3-4			
IMP-IASPOW-GP14	IMP-IASPOW-GP14-SS-QG0030-REG	0-1			TAL Metals, Explosives, VOCs, SVOCs, Pesticides, and Herbicides
	IMP-IASPOW-GP14-DS-QG0031-REG	2-4	IMP-IASPOW-GP14-DS-QG0032-FD	IMP-IASPOW-GP14-DS-QG0031-MS/MSD	
IMP-IASPOW-GP15	IMP-IASPOW-GP15-SS-QG0033-REG	0-1			TAL Metals
	IMP-IASPOW-GP15-DS-QG0034-REG	3-4			

Table 3-2

Soil Sample Designations and Analytical Parameters
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Parameters
			Field Duplicates	MS/MSD	
IMP-IASPOW-GP16	IMP-IASPOW-GP16-SS-QG0035-REG	0-1			TAL Metals
	IMP-IASPOW-GP16-DS-QG0036-REG	3-4			
IMP-IASPOW-GP17	IMP-IASPOW-GP17-SS-QG0037-REG	0-1			TAL Metals
	IMP-IASPOW-GP17-DS-QG0038-REG	3-4			
IMP-IASPOW-GP18	IMP-IASPOW-GP18-SS-QG0039-REG	0-1			TAL Metals
	IMP-IASPOW-GP18-DS-QG0040-REG	3-4			
IMP-IASPOW-GP19	IMP-IASPOW-GP19-SS-QG0041-REG	0-1			TAL Metals
	IMP-IASPOW-GP19-DS-QG0042-REG	3-4			
IMP-IASPOW-GP20	IMP-IASPOW-GP20-SS-QG0043-REG	0-1			TAL Metals
	IMP-IASPOW-GP20-DS-QG0044-REG	3-4			
IMP-IASPOW-MW01	IMP-IASPOW-MW01-SS-QG0017-REG	0-1			TAL Metals and Explosives
	IMP-IASPOW-MW01-DS-QG0018-REG	3-4			
IMP-IASPOW-MW02	IMP-IASPOW-MW02-SS-QG0019-REG	0-1			TAL Metals, Explosives, VOCs, SVOCs, Pesticides, and Herbicides
	IMP-IASPOW-MW02-DS-QG0020-REG	3-4	IMP-IASPOW-MW02-DS-QG0021-FD	IMP-IASPOW-MW02-DS-QG0020-MS/MSD	

FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
TAL - Target analyte list.
SVOC - Semivolatile organic compound.
VOC - Volatile organic compound.

DWG. NO.: ...\796887es.668 | PROJ. NO.: 796887
INITIATOR: G. SISCO | PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY: | ENGR. CHCK. BY: S. MORAN
REV.: | DATE LAST REV.: | DRAWN BY:
STARTING DATE: 01/08/03 | DRAWN BY: D. BOMAR
08/25/2003 09:25:29 AM
dbomar
c:\cadd\design\796887es.668

N

E 675,800

E 676,500

N. 1,180,800

FORMER PRISONER OF WAR (POW) TRAINING FACILITY

IMP-IASPOW-GP15
IMP-IASPOW-GP16
IMP-IASPOW-GP14
IMP-IASPOW-GP06
IMP-IASPOW-GP13
IMP-IASPOW-GP05
IMP-IASPOW-GP17
IMP-IASPOW-GP18
IMP-IASPOW-GP09
IMP-IASPOW-MW01
IMP-IASPOW-GP12
IMP-IASPOW-GP19
IMP-IASPOW-GP11
IMP-IASPOW-GP08
HR-101Q-MW01
IMP-IASPOW-GP04
IMP-IASPOW-GP03
IMP-IASPOW-GP07
IMP-IASPOW-GP10
IMP-IASPOW-MW02
IMP-IASPOW-GP20
IMP-IASPOW-GP02
IMP-IASPOW-GP01
IMPACT AREA
HR-NOM-MW03
A
A'
775
1
2
3

LEGEND

- UNIMPROVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- AREA OF INVESTIGATION
- FORMER PRISONER OF WAR (POW) TRAINING FACILITY
- FENCE
- SURFACE SOIL SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- MONITORING WELL / GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING MONITORING WELL / GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- A A' CROSS SECTION LOCATION

APPROXIMATE LOCATION OF OBSERVED FEATURES

1. .30 CALIBER, 7.62mm AND 5.56mm EXPENDED ROUNDS (BULLETS AND BULLET FRAGMENTS)
2. POSSIBLE TARGET BERM
3. DISTURBED AREAS IDENTIFIED ON AERIAL PHOTOGRAPHS

SOURCE OF AERIAL PHOTOGRAPHS: U.S. ENVIRONMENTAL PROTECTION AGENCY, 1990. INSTALLATION ASSESSMENT ARMY CLOSURE PROGRAM, FORT McCLELLAN, ANNISTON, ALABAMA (TS-PIC-89334), ENVIRONMENTAL PHOTOGRAPHIC INTERPRETATION CENTER (EPIC), ENVIRONMENTAL MONITORING SYSTEMS LABORATORY.

SCALE
0 80 160 FEET

FIGURE 3-1
SAMPLE LOCATION MAP
IMPACT AREA SOUTH OF POW TRAINING FACILITY
FORMER RIFLE/MACHINE GUN RANGE
PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

Shaw™ Shaw Environmental, Inc.

on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, site topography, and Phase I sample results.

Sample Collection. Surface soil samples were collected from the uppermost foot of soil using a stainless-steel hand auger or a DPT sampling system, in accordance with procedures outlined in the SAP. Samples were collected by first removing surface debris (e.g., rocks, vegetation) from the immediate sample area. The soil was collected with the sampling device and screened with a photoionization detector (PID) in accordance with procedures outlined in the SAP. As necessary, the soil fraction for volatile organic compound (VOC) analysis was collected directly from the sampler using three EnCore® samplers. The remaining soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

3.2.2 Subsurface Soil Sampling

A total of 20 subsurface soil samples were collected from 19 soil borings at the IASPOW, as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Sample designations, depths, and analytical parameters are listed in Table 3-2. Soil boring locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, site topography, and Phase I sample results.

Sample Collection. Subsurface soil samples were collected from soil borings at depths greater than one foot below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and samples collected using a stainless-steel hand auger or a DPT sampling system in accordance with procedures specified in the SAP. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

Subsurface soil samples were collected continuously to 4 feet bgs, except at sample location IMP-IASPOW-GP03, which was extended to 6 feet bgs during Phase II sampling. Samples were field screened using a PID to measure for volatile organic vapors. The sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were below background, the deepest sample interval above the saturated zone was submitted for analysis. As necessary, the soil fraction for VOC analysis was collected directly from the sampler using three EnCore® samplers. The remaining portion of soil was then

transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The on-site geologist constructed a detailed boring log for each soil boring. The boring logs are included in Appendix B. At the completion of soil sampling, boreholes were abandoned with bentonite pellets and hydrated with potable water, following borehole abandonment procedures summarized in the SAP.

3.2.3 Monitoring Well Installation

Two permanent groundwater monitoring wells were installed in the saturated zone at the IASPOW to collect groundwater samples for laboratory analysis. The well locations are shown on Figure 3-1. Table 3-3 summarizes construction details of the wells installed at the site. The well construction logs are included in Appendix B.

Shaw contracted Miller Drilling Company to install the permanent wells with a hollow-stem auger drill rig at two of the DPT soil boring locations (IMP-IASPOW-MW01 and IMP-IASPOW-MW02). The wells were installed following procedures outlined in the SAP. The borehole at each well location was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the saturated zone. The borehole was augered to the completion depth of the DPT boring, and samples were collected from that depth to the bottom of the borehole. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geological and hydrogeological information. The on-site geologist constructed a detailed lithological log for each soil boring. Soil characteristics were described using the "Burmeister Identification System" described in Hunt (1986) and the Unified Soil Classification System (USCS) as outlined in the American Society for Testing and Materials (ASTM) Method D 2488 (ASTM, 2000). The boring log for each borehole is included in Appendix B.

Upon reaching the target depth in each borehole, a 20-foot length of 2-inch ID, 0.010-inch continuous slot, Schedule 40 polyvinyl chloride (PVC) screen with an end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A filter pack consisting of number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 5 feet above the top of the well screen as the augers were removed. The filter pack also included a 5-foot layer of extra fine sand (sieve size 30 to 70). A bentonite seal,

Table 3-3

Monitoring Well Construction Summary
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Well Location	Northing	Easting	Ground Elevation (ft amsl)	TOC Elevation (ft amsl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
IMP-IASPOW-MW01	1180623.46	676133.59	786.00	788.07	55	20	35 - 55	2" ID Sch. 40 PVC
IMP-IASPOW-MW02	1180468.36	675865.12	778.28	780.33	55	20	35 - 55	2" ID Sch. 40 PVC

Permanent wells installed using hollow-stem auger.
Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).
Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
amsl - Above mean sea level.
bgs - Below ground surface.
ft - Feet

consisting of approximately 3 feet of bentonite pellets, was placed immediately on top of the filter sand and hydrated with potable water. At wells where the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. The bentonite seal placement and hydration followed procedures in the SAP. Bentonite-cement grout was tremied into the remaining annular space of the well. The well surface completion included installing a protective steel casing and concrete surface pad around the PVC well casing. A well cap was placed on the PVC riser and a lock was placed on the protective steel casing.

The monitoring wells were developed by surging and pumping with a 2-inch-diameter submersible pump in accordance with methodology outlined in the SAP. The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development continued for a maximum of eight hours. The well development logs are included in Appendix C.

3.2.4 Water Level Measurements

The depth to groundwater was measured in permanent wells at the site and vicinity on July 26, 2002, following procedures outlined in the SAP. Depth to groundwater was measured with an electronic water level meter. The meter probe and cable were cleaned before use at each well, following decontamination methodology presented in the SAP. Measurements were referenced to the top of the PVC well casing. A summary of groundwater level measurements for the IASPOW is presented in Table 3-4.

3.2.5 Groundwater Sampling

A total of four groundwater samples were collected from the two monitoring wells installed at the IASPOW. The wells were sampled during both Phase I and Phase II activities. The well/groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. Sample designations and analytical parameters are listed in Table 3-5.

Sample Collection. Groundwater samples were collected using a submersible bladder pump equipped with Teflon™ tubing, following the procedures outlined in the SAP. Groundwater samples were collected after purging a minimum of three well volumes and after field parameters (i.e., temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential, and turbidity) stabilized. Field parameters were measured using a calibrated water-quality meter.

Table 3-4

Groundwater Elevations
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft amsl)	Ground Elevation (ft amsl)	Groundwater Elevation (ft amsl)
IMP-IASPOW-MW01	26-Jul-02	25.32	788.07	786.00	762.75
IMP-IASPOW-MW02	26-Jul-02	25.98	780.33	778.28	754.35
HR-100Q-MW01	26-Jul-02	40.29	771.79	769.80	731.50
HR-100Q-MW02	26-Jul-02	26.25	780.10	778.07	753.85
HR-101Q-MW01	26-Jul-02	22.72	777.31	775.11	754.59
HR-NOM-MW03	26-Jul-02	19.35	789.13	787.13	769.78

Elevations referenced to the North American Vertical Datum of 1988.

amsl - Above mean sea level.
BTOC - Below top of casing.
ft - Feet.

Table 3-5

Groundwater Sample Designations and Analytical Parameters
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples		Analytical Parameters
		Field Duplicates	MS/MSD	
IMP-IASPOW-MW01	IMP-IASPOW-MW01-GW-QG3001-REG			Metals and Explosives
	IMP-IASPOW-MW01-GW-QG3004-REG			Explosives and Pesticides
IMP-IASPOW-MW02	IMP-IASPOW-MW02-GW-QG3002-REG	IMP-IASPOW-MW02-GW-QG3003-FD	IMP-IASPOW-MW02-GW-QG3002-MS/MSD	Metals, Explosives, VOCs, SVOCs, Pesticides, and Herbicides
	IMP-IASPOW-MW02-GW-QG3005-REG	IMP-IASPOW-MW02-GW-QG3006-FD	IMP-IASPOW-MW02-GW-QG3005-MS/MSD	Explosives and Pesticides

FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
VOC - Volatile organic compound.

Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.4.

3.3 Surveying of Sample Locations

Sample locations were surveyed using global positioning system survey techniques and conventional civil survey techniques described in the SAP. Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

3.4 Analytical Program

Samples collected during the SI were analyzed for various chemical and physical parameters based on potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements. Samples collected at the IASPOW were analyzed for the following parameters using EPA SW-846 methods, including Update II Methods where applicable:

- Target analyte list metals – EPA Method 6010B/7000
- Nitroaromatic and nitramine explosives – EPA Method 8330.

In addition, a minimum of ten percent of the samples were analyzed for the following additional parameters:

- Target compound list VOCs – EPA Method 8260B
- Target compound list semivolatile organic compounds (SVOC) – EPA Method 8270C
- Chlorinated pesticides – EPA Method 8081A
- Chlorinated herbicides – EPA Method 8151A
- Organophosphorous pesticides – EPA Method 8141A.

Phase II soil samples were analyzed for the following parameters:

- Target analyte list metals – EPA Method 6010B/7000.

Table 3-6

Groundwater Field Parameters
Impact Area South of POW Training Facility
Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Date	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
IMP-IASPOW-MW01	23-Apr-02	0.046	4.87	148	22.9	10.0	6.06
	2-Oct-02	0.025	8.67	204	20.8	25	5.94
IMP-IASPOW-MW02	24-Apr-02	0.036	3.90	101	21.8	4.2	5.81
	24-Sep-02	0.032	6.94	201	19.8	8.9	6.06

°C - Degree Celsius.
mg/L - Milligram per liter.
mS/cm - Millisiemen per centimeter.
mV - Millivolt.
NTU - Nephelometric turbidity unit.
ORP - Oxidation-reduction potential.
SU - Standard unit.

Phase II groundwater samples were analyzed for the following parameters:

- Nitroaromatic and nitramine explosives – EPA Method 8330
- Chlorinated pesticides – EPA Method 8081A
- Organophosphorous pesticides – EPA Method 8141A.

3.5 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in the SAP. Sample documentation and chain-of-custody records were completed as specified in the SAP.

Completed analysis request and chain-of-custody records (Appendix A) were included with each shipment of sample coolers to EMAX Laboratories, Inc. in Torrance, California.

3.6 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in the SAP. The IDW generated during the SI at the IASPOW was segregated as follows:

- Soil boring cuttings
- Decontamination fluids and purge water from well development and sampling
- Personal protective equipment (PPE) and spent well materials.

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined roll-off bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analyses. Based on the results, soil boring cuttings, spent well materials and PPE were disposed as nonhazardous waste at the Three Corners Landfill located in Piedmont, Alabama.

Liquid IDW was contained in the 20,000-gallon sump associated with the Building T-338 vehicle washrack. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonhazardous waste to the FTMC wastewater treatment plant on the Main Post.

3.7 Variances/Nonconformances

One variance to the SFSP was recorded during completion of the SI at IASPOW. The variance did not alter the intent of the investigation or the sampling rationale presented in the SFSP (IT,

2002b). The variance is summarized in Table 3-7 and the variance report is included in Appendix E.

No nonconformances to the SFSP were recorded during completion of the SI.

3.8 Data Quality

The field sample analytical data are presented in tabular form in Appendix F. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the site-specific work plans; the FTMC SAP and quality assurance plan; and standard, accepted methods and procedures. Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data presented in the SAP. Chemical data were reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms.

Data Validation. The reported analytical data were validated in accordance with EPA National Functional Guidelines by Level III criteria. The data validation results are summarized in quality assurance reports, which include the data validation summary reports (Appendix G). Selected results were qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC Shaw Environmental Management System database for tracking and reporting. The qualified data were used in comparisons to the SSSLs and ESVs. Rejected data (assigned an "R" qualifier) were not used in the comparisons with the SSSLs and ESVs. The data presented in this report, except where qualified, meet the principle data quality objective for this investigation.

Table 3-7

Variance to the Site-Specific Field Sampling Plan
Impact Area South of POW Training Facility
Former/Rifle Machine Gun Ranges, Parcels 100Q and 101Q
Fort McClellan, Calhoun County, Alabama

Variance to the SFSP	Justification for Variance	Impact to Site Investigation
Permanent residuum monitoring well IMP-IASPOW-MW01 was not installed at the proposed location. The monitoring well was installed 15 feet north of the proposed location.	During a site walk performed by Shaw personnel, evidence of lead was visible approximately 15 feet north of the proposed sampling location. Relocation of the soil boring location more accurately determined levels of chemical constituents in site media.	None.

SFSP - Site-Specific Field Sampling Plan.

4.0 Site Characterization

Subsurface investigations performed at the Impact Area South of Former POW Training Facility, Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q, provided soil, geologic, and groundwater data used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold-and-thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold-and-thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted, with major structures and faults striking in a northeast-southwest direction.

Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock, referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults, and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and DeJarnette (1992) and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group consists of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984) but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper, undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish gray siltstone and mudstone. Massive to laminated

greenish gray and black mudstone makes up the Nichols Formation, with thin interbeds of siltstone and very fine-grained sandstone (Osborne et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The coarse-grained facies appears to dominate the unit and consists primarily of coarse-grained, vitreous quartzite and friable, fine- to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consists of sandy and micaceous shale and silty, micaceous mudstone, which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east, and southwest of the Main Post and consists of interlayered bluish gray or pale yellowish gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline, porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne, 1999).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post, as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated, thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962; Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark gray, finely to coarsely crystalline, medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded

to laminated, siliceous dolomite and dolomitic limestone that weather to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone consists of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped as undifferentiated at FTMC and in other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites, and limestones and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Osborne et al., 1988). This unit occurs locally in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark to light gray limestone with abundant chert nodules and greenish gray to grayish red phosphatic shale, with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale based on fossil data.

The Pennsylvanian Parkwood Formation overlies the Floyd Shale and consists of a medium to dark gray, silty, clay shale and mudstone with interbedded light to medium gray, very fine to fine grained argillaceous, micaceous sandstone. Locally the Parkwood Formation also contains beds of medium- to dark-gray argillaceous, bioclastic to cherty limestone and beds of clayey coal up to a few inches thick (Raymond et al., 1988). The Parkwood Formation in Calhoun County is generally found within a structurally complex area known as the Coosa deformed belt. In the deformed belt, the Parkwood Formation and Floyd Shale are mapped as undifferentiated because their lithologic similarity and significant deformation make it impractical to map the contact (Thomas and Drahovzal, 1974; Osborne et al., 1988). The undifferentiated Parkwood Formation and Floyd Shale are found throughout the western quarter of Pelham Range.

The Jacksonville thrust fault is the most significant structural geologic feature in the vicinity of the Main Post of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama, and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City fault (Osborne and Szabo, 1984). The Ordovician sequence that makes up the Eden thrust sheet is exposed at FTMC through an eroded window, or fenster, in the overlying thrust sheet. Rocks within the window display complex folding, with the folds being overturned and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation; north by the Conasauga Formation; northeast, east, and southwest by the Shady Dolomite, and southeast and southwest by the Chilhowee Group (Osborne et al., 1997). Two small klippen of the Shady Dolomite, bounded by the Jacksonville fault, have been recognized adjacent to the Pell City fault at the FTMC window (Osborne et al., 1997).

The Pell City fault serves as a fault contact between the bedrock within the FTMC window and the Rome and Conasauga Formations. The trace of the Pell City fault is also exposed approximately nine miles west of the FTMC window on Pelham Range, where it traverses northeast to southwest across the western quarter of Pelham Range. Here, the trace of the Pell City fault marks the boundary between the Pell City thrust sheet and the Coosa deformed belt.

The eastern three-quarters of Pelham Range is located within the Pell City thrust sheet, while the remaining western quarter of Pelham is located within the Coosa deformed belt. The Pell City thrust sheet, a large-scale thrust sheet containing Cambrian and Ordovician rock, is relatively less structurally complex than the Coosa deformed belt (Thomas and Neathery, 1982). The Pell City thrust sheet is exposed between the traces of the Jacksonville and Pell City faults along the

western boundary of the FTMC window and along the trace of the Pell City fault on Pelham Range (Thomas and Neathery, 1982; Osborne et al., 1988). The Coosa deformed belt is a narrow (approximately 5 to 20 miles wide) northeast-to-southwest-trending linear (approximately 90 miles in length) zone of complex structure consisting mainly of thin, imbricate thrust slices. The structure within these imbricate thrust slices is often internally complicated by small-scale folding and additional thrust faults (Thomas and Drahovzal, 1974).

4.1.2 Site Geology

Soils at the IASPOW fall mainly into four mapping units: Cumberland gravelly loam, Anniston and Allen gravelly loam, Anniston gravelly clay loam, and Stony Rough Land sandstone (U.S. Department of Agriculture [USDA], 1961).

The Cumberland gravelly loam consists of deep, well-drained soils that have generally developed in old alluvium that washed from soils derived mainly from limestone, cherty limestone, shale, and sandstone. The surface soil of the Cumberland gravelly loam ranges from very dark brown to reddish brown. The subsoil ranges from dark red to red in color and from silt clay loam to clay in texture. The thickness of the alluvium ranges from 2 to greater than 15 feet. Some areas included in this soil mapping unit have a silt loam to gravelly fine sandy loam surface soil which is generally underlain in places by beds of gravel or sand. Infiltration of this soil type is medium, runoff is medium, permeability is moderate, and the capacity for available moisture is high (USDA, 1961).

The Anniston and Allen gravelly loam consists of deep, strongly acid, well-drained soils that have developed in old local alluvium. The parent material washed from adjacent, higher lying soils that developed from weathered sandstone, shale, and quartzite. The surface horizon of the Anniston and Allen gravelly loam is very dark to dark grayish-brown fine sandy loam or loam. The subsoil is dark red fine sandy clay loam. Fragments of sandstone and quartzite are found on the surface and throughout the soil. Infiltration and runoff of this soil type are medium, permeability is moderate, and the capacity for available moisture is high (USDA, 1961).

The Anniston gravelly clay loam consists of friable, medium to strongly acidic, deep, well-drained soils that have developed in old local alluvium on the foot slopes and along the base of larger hills in the region. The parent material for the Anniston gravelly clay loam is washed from adjacent, higher-lying soils that developed from weathered sandstone, shale, and quartzite. Sandstone and quartzite gravel, cobbles, and fragments as much as 8 inches in diameter are on the surface and throughout the soil. The surface soil of this unit is a reddish brown gravelly clay

loam 4 to 6 inches thick. In most places, it is underlain by red or dark reddish brown gravelly clay loam. In this unit, infiltration is moderately low and the capacity for available moisture is low (USDA, 1961).

The Stony Rough Land sandstone consists of rough, mountainous areas with many outcrops of sandstone and quartzite bedrock, loose rock fragments, and scattered patches of sandy soil material. Slopes are generally more than 25 percent. The soil material is generally shallow over bedrock. Runoff is high, infiltration is slow, and the capacity for available moisture is low (USDA, 1961).

Bedrock at the site is mapped as the Cambrian Conasauga Formation, as shown as Figure 4-1 (Osborne et al., 1997). The Conasauga Formation consists of varying proportions of limestone, dolomite, and shale (Raymond et al., 1988). The upper part of the formation is mapped as a light to dark gray, medium to thick-bedded dolostone. Dark greenish gray, dusky yellow and pale olive shales and mudstones are found in the lower part of the formation, and locally contain interbeds of limestone (sometimes cherty) and rare siltstone. Limestone interbeds are medium to dark gray, thin to medium bedded, micritic, argillaceous, and locally oolitic or oncolitic (Raymond et al., 1988). South of the IASPOW, the Jacksonville Fault thrusts the Undifferentiated Cambrian Chilhowee Group over the Cambrian Conasauga Formation (Osborne et al., 1997).

A geologic cross section was constructed using hollow-stem auger boring data collected at the IASPOW, Parcel 101Q, and the Area North of MOUT (Military Operations in Urban Terrain), as shown on Figure 4-2. The residuum at the IASPOW and surrounding area consists predominantly of yellowish orange to reddish brown clay with some silt and sand, and trace quartz-rich gravel. Bedrock was not encountered during monitoring well installation at the IASPOW.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 53 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates (U.S. Department of Commerce, 1998). The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction toward the Coosa River on the western boundary of Calhoun County.

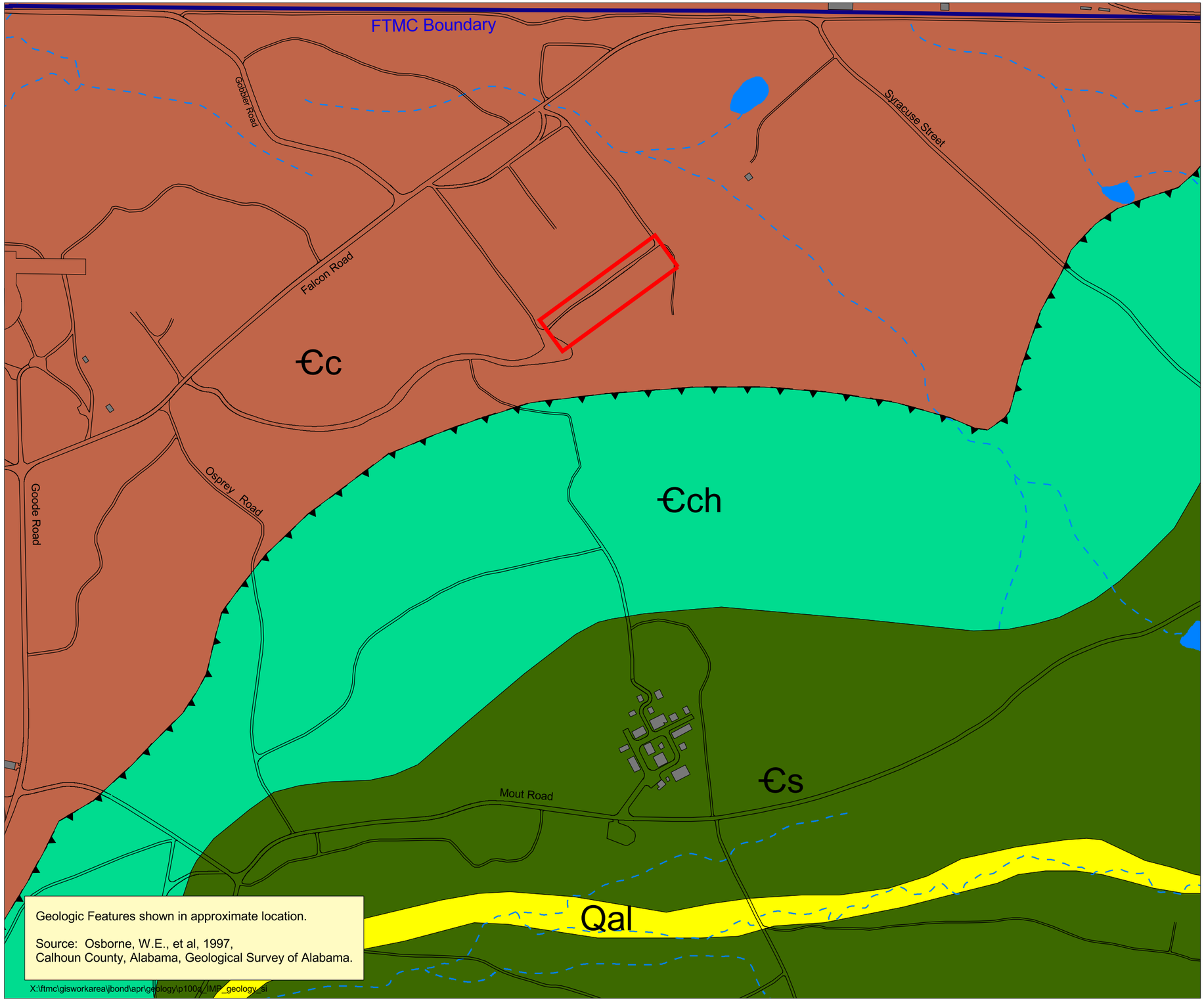


Figure 4-1

Site Geologic Map

Impact Area South of Former POW Training Facility, Former Rifle/Machine Gun Ranges, Parcels 100Q and 101Q, Fort McClellan, Alabama

Legend

- Area of Investigation
- Buildings
- Surface Water Feature (may be ephemeral)
- Roads
- Streams (dashed where intermittent)

Geology

- Qal — Quaternary - Alluvium
- €c — Cambrian - Conasauga Formation
- €s — Cambrian - Shady Dolomite
- €ch — Cambrian - Chilhowee Group, undifferentiated
- Thrust Fault (dashed where inferred; barbs on upper plate)

500 0 500 Feet

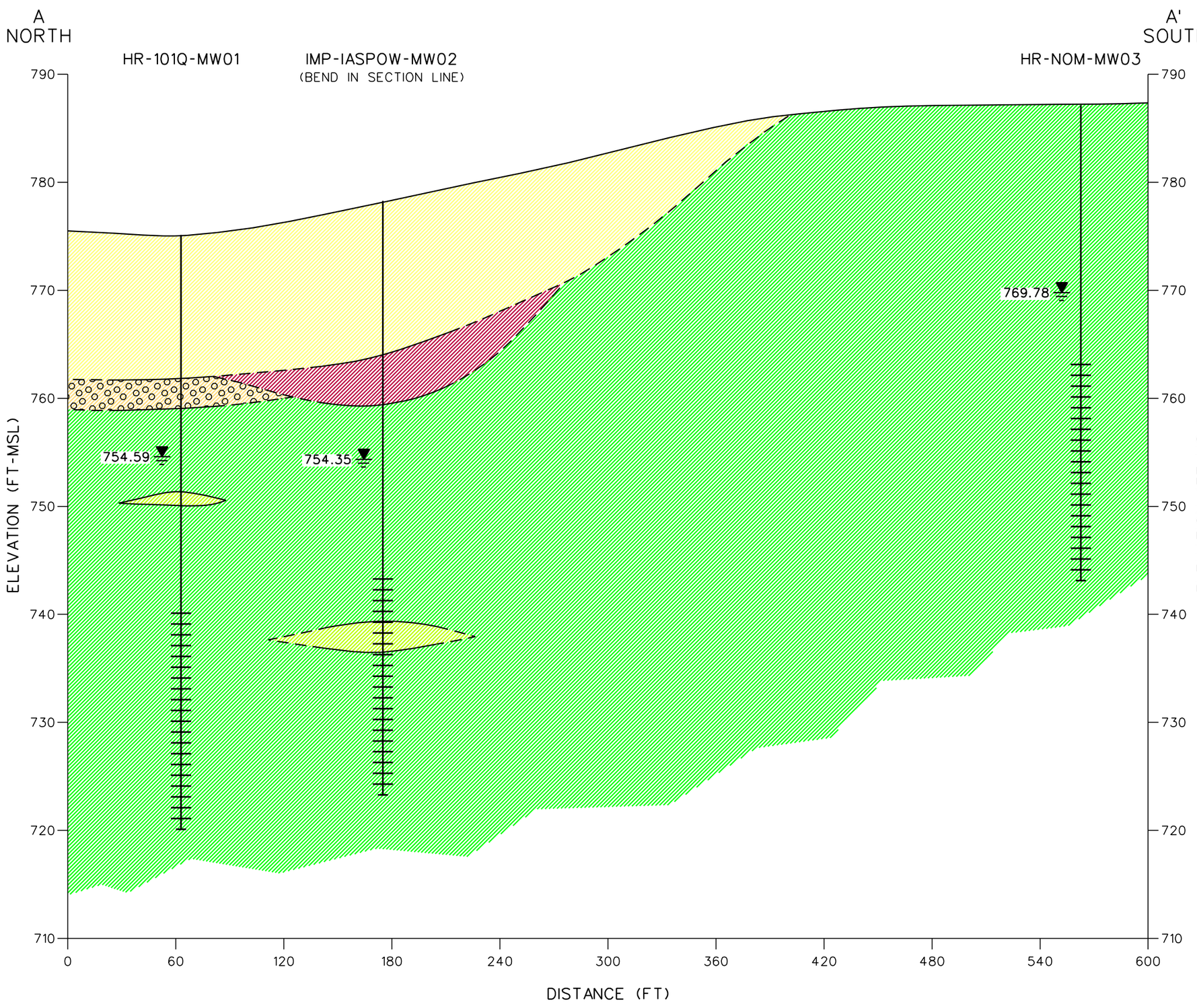
NAD83 State Plane Coordinates

N

Shaw Environmental, Inc.

U.S. Army Corps of Engineers Mobile District

Contract No. DACA21-96-D-0018



LEGEND

- SCREEN INTERVAL
- WATER TABLE (JULY 26, 2002)
- 754.35 GROUNDWATER ELEVATION (FT MSL)
- CONTACT DASHED WHERE INFERRED
- SILT, LITTLE TO SOME CLAY
- SILT AND SAND, SOME CLAY
- GRAVEL AND SAND, SOME CLAY
- CLAY AND SAND, SOME SILT
- CLAY, SOME SAND, SOME TO LITTLE SILT, LITTLE GRAVEL

NOTES:

1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
2. DASHED WHERE INFERRED.
3. SEE FIGURE 3-1 FOR CROSS SECTION LOCATION.

HORIZONTAL
0 60 120 FEET

VERTICAL
0 10 20 FEET

FIGURE 4-2
GEOLOGIC CROSS SECTION A-A'
IMPACT AREA SOUTH OF POW
TRAINING FACILITY
FORMER RIFLE/MACHINE GUN RANGE
PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

Shaw Environmental, Inc.

DWG. NO.: ...\796887es689 | PROJ. NO.: 796887
INITIATOR: C. LEVAAS | PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY: | ENGR. CHCK. BY: S. MORAN
DATE LAST REV.: | DRAWN BY:
STARTING DATE: 03/04/03 | DRAWN BY: D. BOMAR
08/25/2003 10:16:37 AM
dbomar
c:\cadd\design\796887es.689

Ground elevation within the area of investigation ranges from approximately 775 to 800 feet above mean sea level. Surface water runoff at the site follows the topography and flows in a northwesterly direction toward Reilly Lake. Surface water features are not located within the area of investigation at the IASPOW.

4.2.2 Hydrogeology

Static groundwater levels were measured in the monitoring wells at IASPOW on July 26, 2002, as summarized in Table 3-4. Groundwater elevations were calculated by measuring the depth to groundwater relative to the surveyed top-of-casing elevations, following procedures outlined in the SAP. A groundwater elevation map (Figure 4-3) was constructed using the July 26, 2002 water-level data from the IASPOW and surrounding parcels. Groundwater flow at the site is to the northwest, generally following topography.

DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
INITIATOR: J. REMO
PROJ. MGR.: J. YACOUB
STARTING DATE:08/29/02
DRAWN BY: D. BOMAR
DATE LAST REV.:
DRAWN BY:
DWG. NO.: ...\796887es.524
PROJ. NO.: 796887
08/29/2003
10:35:26 AM
dbomar
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N

E 674,700

E 676,700

N 1,181,400

N 1,180,000

GOBBLER ROAD

FALCON ROAD

FLOW DIRECTION

G.W. FLOW

HR-100Q-MW01
(731.50)

HR-100Q-MW02
(753.85)

HR-101Q-MW01
(754.59)

IMP-IASPOW-MW01
(762.75)

IMP-IASPOW-MW02
(754.35)

HR-NOM-MW03
(769.78)

730

740

750

760

770

775

800

825

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- (731.50) GROUNDWATER ELEVATION (FT MSL) (JULY 26, 2002)
- G.W. FLOW GROUNDWATER FLOW DIRECTION
- TREES / TREELINE
- MARSH / WETLANDS
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- MONITORING WELL LOCATION

SCALE
0 200 400 FEET

FIGURE 4-3
GROUNDWATER ELEVATION MAP
IMPACT AREA SOUTH OF POW
TRAINING FACILITY
FORMER RIFLE/MACHINE GUN RANGE
PARCELS 100Q AND 101Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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